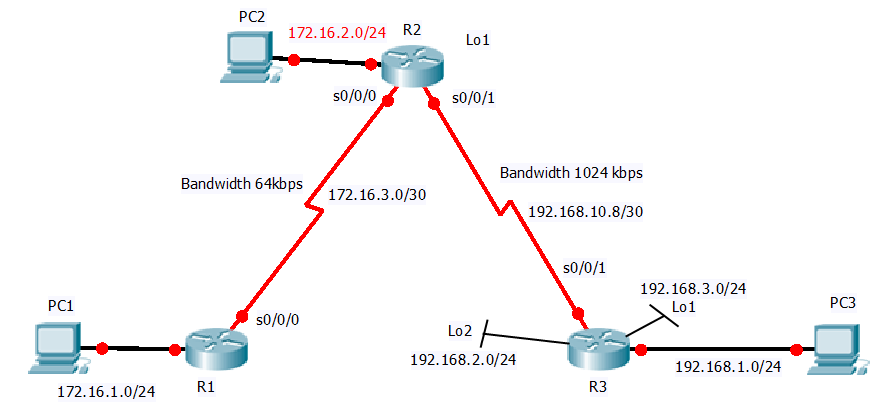
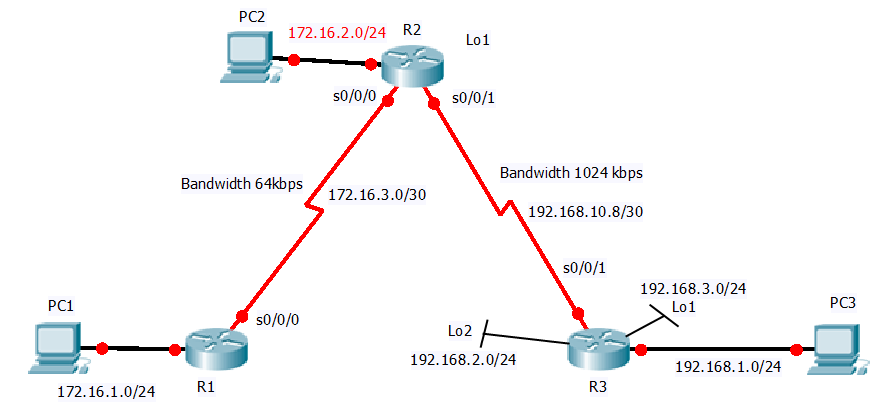
## Lab 8: EIGRP Configuration Lab



Lo0 10.1.1.0/30



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DEVICE** | **Interface** | **IP Address** | **Subnet Mask** | **Default Gateway** |
| **R1** | Fa0/0 | 172.16.1.1 | 255.255.255.0 | N/A |
|  | S0/0/0 | 172.16.3.1 | 255.255.255.252 | N/A |
| **R2** | Fa0/0 | 172.16.2.1 | 255.255.255.0 | N/A |
|  | S0/0/0 | 172.16.3.2 | 255.255.255.252 | N/A |
|  | S0/0/1 | 192.168.10.9 | 255.255.255.252 | N/A |
|  | Lo0 | 10.1.1.1 | 255.255.255.252 | N/A |
| **R3** | Fa0/0 | 192.168.1.1 | 255.255.255.0 | N/A |
|  | S0/0/1 | 192.168.10.10 | 255.255.255.252 | N/A |
|  | Lo0 | 192.168.2.1 | 255.255.255.0 | N/A |
|  | Lo1 | 192.168.3.1 | 255.255.255.0 | N/A |
| **PC1** | NIC | 172.16.1.10 | 255.255.255.0 | 172.16.1.1 |
| **PC2** | NIC | 172.16.2.10 | 255.255.255.0 | 172.16.2.1 |
| **PC3** | NIC | 192.168.1.10 | 255.255.255.0 | 192.168.1.1 |

### Learning Objectives

Upon completion of this lab, you will be able to:

* Cable a network according to the Topology Diagram.
* Erase the start-up configuration and reload a router to the default state.
* Perform basic configuration tasks on a router.
* Configure and activate interfaces.
* Configure EIGRP routing on all routers.
* Verify EIGRP routing using show commands.
* Disable automatic summarization.
* Configure manual summarization.
* Document the EIGRP configuration.

### Scenario

In this lab activity, you will learn how to configure the routing protocol EIGRP using the network shown in the Topology Diagram. A loopback address will be used on the R2 router to simulate a connection to an ISP, where all traffic that is not destined for the local network will be sent. Some segments of the network have been subnetted using VLSM. EIGRP is a classless routing protocol that can be used to provide subnet mask information in the routing updates. This will allow VLSM subnet information to be propagated throughout the network.

### Task 1: Prepare the Network.

#### Step 1: Cable a network that is similar to the one in the Topology Diagram.

#### Step 2: Clear any existing configurations on the routers.

### Task 2: Perform Basic Router Configurations.

Perform basic configuration of the R1, R2, and R3 routers according to the following guidelines:

1. Configure the router hostname.
2. Disable DNS lookup.
3. Configure an EXEC mode password.
4. Configure a message-of-the-day banner.
5. Configure a password for console connections.
6. Configure a password for VTY connections.

### Task 3: Configure and Activate Serial and Ethernet Addresses.

#### Step 1: Configure the interfaces on the R1, R2, and R3 routers.

Configure the interfaces on the R1, R2, and R3 routers with the IP addresses from the table under the Topology Diagram.

#### Step 2: Verify IP addressing and interfaces.

Use the show ip interface brief command to verify that the IP addressing is correct and that the interfaces are active.   
When you have finished, be sure to save the running configuration to the NVRAM of the router.

#### Step 3: Configure Ethernet interfaces of PC1, PC2, and PC3.

Configure the Ethernet interfaces of PC1, PC2, and PC3 with the IP addresses and default gateways from the table under the Topology Diagram.

### Task 4: Configure EIGRP on the R1 Router.

#### Step 1: Enable EIGRP.

Use the **router eigrp command** in global configuration mode to enable EIGRP on the R1 router. Enter a process ID of 1 for the autonomous-system parameter.   
R1(config)#**router eigrp 1**

#### Step 2: Configure classful network 172.16.0.0.

Once you are in the Router EIGRP configuration sub-mode, configure the classful network 172.16.0.0 to be included in the EIGRP updates that are sent out of R1.   
R1(config-router)#**network 172.16.0.0**  
  
The router will begin to send EIGRP update messages out each interface belonging to the 172.16.0.0 network. EIGRP updates will be sent out of the FastEthernet0/0 and Serial0/0/0 interfaces because they are both on subnets of the 172.16.0.0 network.

When you are finished with the EIGRP configuration for R1, return to privileged EXEC mode and save the current configuration to NVRAM.

### Task 5: Configure EIGRP on the R2 and R3 Routers.

#### Step 1: Enable EIGRP routing on the R2 router using the router eigrp command.

Use a process ID of 1.  
R2(config)#**router eigrp 1**

#### Step 2: Use the classful address 172.16.0.0 to include the network for the FastEthernet0/0 interface.

R2(config-router)#**network 172.16.0.0**  
  
Notice that DUAL sends a notification message to the console stating that a neighbor relationship with another EIGRP router has been established.   
What is the IP address of the EIGRP neighbor router?   
172.16.3.1  
What interface on the R2 router is the neighbor adjacent to?  
S0/0/0

#### Step 3: Configure the R2 router to advertise the 192.168.10.8/30 network attached to the Serial0/0/1 interface.

* Use the wildcard-mask option with the network command to advertise only the subnet and not the entire 192.168.10.0 classful network.   
  2. When you are finished, return to privileged EXEC mode.  
  R2(config-router)#**network 192.168.10.8 0.0.0.3**

R2(config-router)#**network 10.1.1.0 0.0.0.3**

R2(config-router)#**end**

#### Step 4: Configure EIGRP on the R3 router using the router eigrp and network commands.

1. Use a process ID of 1.   
2. Use the classful network address for the network attached to the FastEthernet0/0 interface.   
3. Include the wildcard masks for the subnets attached to the Serial 0/0/1 interface.   
4. When you are finished, return to privileged EXEC mode.

R3(config)#**router eigrp 1**  
R3(config-router)#**network 192.168.1.0**

R3(config-router)#**network 192.168.10.8 0.0.0.3**

R3(config-router)#**network 192.168.2.0**

R3(config-router)#**network 192.168.3.0**  
R3(config-router)#**end**  
  
Notice that when the networks for the serial link from R3 to R2 are added to the EIGRP configuration, DUAL sends a notification message to the console stating that a neighbor relationship with another EIGRP router has been established.

### Task 6: Verify EIGRP Operation.

#### Step 1: View neighbors.

On the R2 router, use the show ip eigrp neighbors command to view the neighbor table and verify that EIGRP has established an adjacency with the R1 and R3 routers. You should be able to see the IP address of each adjacent router and the interface that R1 uses to reach that EIGRP neighbor.  
R2#**show ip eigrp neighbors**

#### Step 2: View routing protocol information.

On the R2 router, use the show ip protocols command to view information about the routing protocol operation. Notice that the information that was configured in Task 5, such as protocol, process ID, and networks, is shown in the output. The IP addresses of the adjacent neighbors are also shown.  
R2#**show ip protocols**  
  
Notice that the output specifies the process ID used by EIGRP. Remember, the process ID must be the same on all routers for EIGRP to establish neighbor adjacencies and share routing information.

### Task7: Examine EIGRP Routes in the Routing Tables.

#### Step1: View the routing table on the R1 router.

EIGRP routes are denoted in the routing table with a D, which stands for DUAL (Diffusing Update Algorithm), which is the routing algorithm used by EIGRP.  
R1#show ip route  
  
Notice that the 172.16.0.0/16 parent network is variably subnetted with three child routes using either a /24 or /30 mask. Also notice that EIGRP has automatically included a summary route to Null0 for the 172.16.0.0/16 network. The 172.16.0.0/16 route does not actually represent a path to reach the parent network, 172.16.0.0/16. If a packet destined for 172.16.0.0/16 does not match one of the level 2 child routes, it is sent to the Null0 interface.   
  
The 192.168.10.0/24 Network is also variably subnetted and includes a Null0 route.

#### Step 2: View the routing table on the R3 router.

The routing table for R3 shows that both R1 and R2 are automatically summarizing the 172.16.0.0/16 network and sending it as a single routing update. Because of automatic summarization, R1 and R2 are not propagating the individual subnets.

### Task 8: Configure EIGRP Metrics.

#### Step 1: View the EIGRP metric information.

Use the **show ip interface command** to view the EIGRP metric information for the Serial0/0/0 interface on the R1 router. Notice the values that are shown for the bandwidth, delay, reliability, and load.  
R1#**show interface serial0/0/0**

#### Step 2: Modify the bandwidth of the Serial interfaces.

On most serial links, the bandwidth metric will default to 128 Kbits. If this is not the actual bandwidth of the serial link, the bandwidth will need to be changed so that the EIGRP metric can be calculated correctly.   
For this lab, the link between R1 and R2 will be configured with a bandwidth of 64 kbps, and the link between R2 and R3 will be configured with a bandwidth of 1024 kbps. Use the bandwidth command to modify the bandwidth of the Serial interfaces of each router.   
R1 router:  
R1(config)#**interface serial0/0/0**  
R1(config-if)#**bandwidth 64**  
  
R2 router:  
R2(config)#**interface serial0/0/0**  
R2(config-if)#**bandwidth 64**  
R2(config)#**interface serial0/0/1**  
R2(config-if)#**bandwidth 1024**  
  
R3 router:  
R3(config)#**interface serial0/0/1**  
R3(config-if)#**bandwidth 1024**  
  
Note: The bandwidth command only modifies the bandwidth metric used by routing protocols, not the physical bandwidth of the link.

#### Step 3: Verify the bandwidth modifications.

Use the **show ip interface** command to verify that the bandwidth value of each link has been changed.  
  
Note: Use the interface configuration command **no bandwidth** to return the bandwidth to its default value.

### Task 9: Disable EIGRP Automatic Summarization.

#### Step 1: Disable automatic summarization on all three routers with the no auto-summary command.

R1(config)#**router eigrp 1**  
R1(config-router)#**no auto-summary**  
  
R2(config)#**router eigrp 1**  
R2(config-router)#**no auto-summary**  
  
R3(config)#**router eigrp 1**  
R3(config-router)#**no auto-summary**

#### Step 4: View the routing table on R1 again.

Notice that individual routes for the 172.16.1.0/24, 172.16.2.0/24, and 172.16.3.0/24 subnets are now present and the summary Null route is no longer listed.

### Task 10: Add Loopback Interfaces.

#### Step 1: Add loopback addresses to R3 router.

Add two loopback addresses, 192.168.2.1/24 and 192.168.3.1/24, to the R3 router. These virtual interfaces will be used to represent networks to be manually summarized along with the 192.168.1.0/24 LAN.  
R3(config)#**interface loopback1**  
R3(config-if)#**ip address 192.168.2.1 255.255.255.0**   
R3(config-if)#**interface loopback2**  
R3(config-if)#**ip address 192.168.3.1 255.255.255.0**

#### Step 2: Add the 192.168.2.0 and 192.168.3.0 networks to the EIGRP configuration on R3.

R3(config)#**router eigrp 1**  
R3(config-router)#**network 192.168.2.0**  
R3(config-router)#**network 192.168.3.0**

#### Step 3: Verify new routes.

View the routing table on the R1 router to verify that the new routes are being sent out in the EIGRP updates sent by R3.